AMENDMENTS TO THE CLAIMS

Please amend the claims as follows:

Listing of Claims:

Claim 1 (Currently Amended): A data processing apparatus operable to identify a code word present in a marked version of a material item, the material item composed of a plurality of units and the code word composed of a plurality of parts, each part including different data from the code word, the marked version formed by combining each of the plurality of parts of the code word with one of the plurality of units, the apparatus comprising

a recovery processor operable to recover a partial code word composed by-of at least one of the plurality of parts of the code word from at least one of the plurality of corresponding units of the marked material item, and

a correlator operable to generate for the marked material item a dependent correlation value by correlating the partial code word with a corresponding partial stored code word that is a part of a whole stored code word, and

a detector operable to determine whether the whole stored code word is present in the marked material item based on the dependent correlation value for the partial code word exceeding a predetermined threshold, wherein

when the dependent correlation value does not exceed the predetermined threshold, the correlator is operable to iteratively increase a number of parts of the partial code word used, to increase information quantity of the recovered partial code word,

each time the information quantity of the partial code word is increased, the correlator is operable to generate a dependent correlation value by correlating the partial code word having increased information quantity with a corresponding partial stored code word, the iterative increasing of the information quantity of the partial code word continuing until

the whole code word is recovered by the recovery processor, and correlated with the whole

stored code word by the correlator, or the predetermined threshold exceeded.

Claim 2 (Previously Presented): A data processing apparatus as claimed in Claim 1,

wherein the detector is operable in combination with the correlator to form dependent

correlation values for a plurality of partial code words in parallel, and if some of the

correlation values exceed the predetermined threshold, the detector is operable to identify the

code word according to a predetermined false detection probability.

Claim 3 (Previously Presented): A data processing apparatus as claimed in Claim 2,

wherein the detector is operable in combination with the correlator to form the dependent

correlation values by combining the plurality of parts of the code word recovered from

successive material units to form a partial code word, and by correlating the partial code word

formed from successive material units with corresponding part of the partial stored code

word.

Claim 4 (Previously Presented): A data processing apparatus as claimed in Claim 3,

wherein the correlator is operable to form the dependent correlation values by combining the

plurality of parts of the code word recovered from a first plurality of successive units with

plurality of parts of the code word recovered from second plurality of successive units to

generate first and second partial code words, and correlating the first and second partial code

words with corresponding parts of the partial stored code words.

Claim 5 (Previously Presented): A data processing apparatus as claimed in Claim 1,

wherein the correlator is operable under control of the detector

to combine the parts of the code word recovered from a first plurality of successive

units, and to form the dependent correlation value for the combined parts forming a first

partial code word, the detector being operable to detect the whole code word if the dependent

correlation value exceeds the predetermined threshold and otherwise

to combine the parts of the code word recovered from a second plurality of successive

units, the number of units corresponding to the first plurality, and to form the dependent

correlation value for the combined parts forming a second partial code word, the detector

being operable to detect the whole code word if the dependent correlation value exceeds the

predetermined threshold and otherwise

to combine the parts of the code word recovered from the first plurality of successive

units with parts of the code word recovered from the second plurality of successive units, and

to form the dependent correlation value for the combined parts forming a third partial code

word, the detector being operable to detect the whole code word if the dependent correlation

value exceeds the predetermined threshold and otherwise

to combine the parts of the code word recovered from a third plurality of successive

units, and to form the dependent correlation value for the combined parts forming a fourth

partial code word, the detector being operable to detect the whole code word if the dependent

correlation value exceeds the predetermined threshold and otherwise

to combine the parts of the code word recovered from a fourth plurality of successive

units, the number of units corresponding to the third plurality, and to form the dependent

correlation value for the combined parts forming a fifth partial code word, the detector being

operable to detect the whole code word if the dependent correlation value exceeds the

predetermined threshold and otherwise

to combine the parts of the code word recovered from the third plurality of successive

units with parts of the code word recovered from the fourth plurality of successive units, and

to form the dependent correlation value for the combined parts forming a sixth partial code

word, the detector being operable to detect the code word if the dependent correlation value

exceeds the predetermined threshold and otherwise to form iteratively the first, second, third

and fourth plurality of parts of the recovered code word, and to determine whether the

dependent correlation value exceeds the threshold.

Claim 6 (Cancelled).

Claim 7 (Previously Presented): A data processing apparatus as claimed in Claim 1,

wherein the detector and the correlator are operable in combination to form the dependent

correlation value for at least one selected code word re-generated from a set of code words

that are stored, the code word being selected from the set in accordance with the relative

magnitudes of the dependent correlation value formed for each code word of the set.

Claim 8 (Previously Presented): A data processing apparatus as claimed in Claim 1,

wherein the whole code word is part of a set of code words that are formed from a first code

word having a plurality of predetermined pseudo-randomly distributed coefficients and by

generating other code words of the set by cyclically shifting the first code word, and the

correlation value is formed for a plurality of the code words by

forming a Fourier transform of the recovered partial code word,

forming a Fourier transform of the first code word of the set,

forming the complex conjugate of one of the Fourier transform of the recovered

partial code word and the Fourier transform of the regenerated code word,

forming intermediate product samples by multiplying each of the Fourier transform

samples of the recovered partial code word and the corresponding Fourier transform samples

of the first code word,

forming correlation samples by forming an inverse transform of the intermediate

product samples, each of the correlation value samples providing the correlation value for one

of the set of code words, wherein the forming a Fourier transform of the part of the recovered

partial code word comprises setting the remaining part of the recovered code word to zero,

and forming the Fourier transform of the recovered code word, and

the forming a Fourier transform of the first code word of the set comprises setting the

remaining part of the first code word to zero, and forming the Fourier transform of the first

code word.

Claim 9 (Previously Presented): A data processing apparatus as claimed in Claim 1,

wherein the code word has been introduced into the material item in the discrete cosine

transform domain, the apparatus further comprising:

a discrete cosine transform processor operable to transform the marked material item

and the original material item into the discrete cosine transform domain, wherein the recovery

processor is operable to generate the recovered partial code word by subtracting

corresponding discrete cosine transform coefficients of the original material version from

discrete cosine transform coefficients of the marked material version.

Claim 10 (Previously Presented): A data processing apparatus as claimed in Claim 1,

wherein the material is video material, the plurality of material units being video images.

Claim 11 (Currently Amended): A method of identifying a code word present in a marked material item, the marked material item composed of a plurality of units and the code word composed of a plurality of parts, each part including different data from the code word, the marked version formed by combining each of the plurality of parts of the code word with one of the plurality of units, the method comprising:

recovering a partial code word composed ~~by~~ of at least one of the plurality of parts of the code word from at least one of the plurality of corresponding units of the marked material item,

generating for the marked material item a dependent correlation value by correlating the partial code word with a corresponding partial stored code word that is a part of a whole stored code word, and

determining whether the whole code word is present in the marked material item based on the dependent correlation value for the partial code word exceeding a predetermined threshold,

when the dependent correlation value does not exceed the predetermined threshold, iteratively increasing a number of parts of the partial code word used, to increase information quantity of the recovered partial code word, and

each time the information quantity of the partial code word is iteratively increased, generating a dependent correlation value by correlating the partial code word having increased information quantity with a corresponding partial stored code word, the iterative increasing of the information quantity of the partial code word continuing until the whole code word is recovered by said step of recovering, and correlated with the whole stored code word by said step of generating, or the predetermined threshold exceeded.

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Claim 12 (Previously Presented): A method of identifying as claimed in Claim 11, wherein the generating a dependent correlation value comprises

forming dependent correlation values for each of a plurality of partial code words in parallel, and if some of the correlation values exceed the predetermined threshold,

identifying the code word according to a predetermined false detection probability.

Claim 13 (Previously Presented): A method of identifying as claimed in Claim 12, wherein the generating a dependent correlation value includes forming the dependent correlation values by combining the plurality of parts of the code word recovered from successive material units to form a partial code word, and by correlating the parts formed from successive units with corresponding part of the regenerated code word.

Claim 14 (Previously Presented): A method of identifying as claimed in Claim 13, wherein the generating a dependent correlation value includes forming the dependent correlation values by combining the plurality of parts of the code word recovered from a first plurality of successive material units with a plurality of parts of the code word recovered from second plurality of successive units to generate first and second partial code words, and correlating the first and second partial code words with corresponding parts of the partial stored code word.

Claim 15 (Previously Presented): A method of identifying as claimed in Claim 11, wherein the generating a dependent correlation value includes

combining the parts of the code word recovered from a first plurality of successive units,

forming the dependent correlation value for the combined parts forming a first partial

code word, and detecting the whole code word if the dependent correlation value exceeds the

predetermined threshold and otherwise

combining the parts of the code word recovered from a second plurality of successive

units, the number of units corresponding to the first plurality,

forming the dependent correlation value for the combined parts forming a second

partial code word, and detecting the whole code word if the dependent correlation value

exceeds the predetermined threshold and otherwise

combining the parts of the code word recovered from the first plurality of successive

units with parts of the code word recovered from the second plurality of successive units,

forming the dependent correlation value for the combined parts forming a third partial

code word, and detecting the whole code word if the dependent correlation value exceeds the

predetermined threshold and otherwise

combining the parts of the code word recovered from a third plurality of successive

units,

forming the dependent correlation value for the combined parts forming a fourth

partial code word, and detecting the whole code word if the dependent correlation value

exceeds the predetermined threshold and otherwise

combining the parts of the code word recovered from a fourth plurality of successive

units, the number of units corresponding to the third plurality,

forming the dependent correlation value for the combined parts forming a fifth partial

code word, and detecting the whole code word if the dependent correlation value exceeds the

predetermined threshold and otherwise

combining the parts of the code word recovered from the third plurality of successive

units with parts of the code word recovered from the fourth plurality of successive units,

forming the dependent correlation value for the combined parts forming a sixth partial

code word, and detecting the whole code word if the dependent correlation value exceeds the

predetermined threshold and otherwise

forming iteratively the first, second, third and fourth plurality of parts of the recovered

code word, and

determining whether the dependent correlation value exceeds the threshold.

Claim 16 (Cancelled).

Claim 17 (Currently Amended): An encoding data processing apparatus comprising:

a recovery processor operable to recover a partial code word that is composed by-of at

least one part of a whole code word, each part including different data from the code word,

the partial code word recovered from a corresponding unit of a marked material item, the

marked material item composed of a plurality of units, the marked version formed by

combining each part of the code word with one of the plurality of units,

a correlator operable to generate for the marked material item a dependent correlation

value by correlating the partial code word with a corresponding partial stored code word that

is a part of a whole stored code word, and

a detector operable to determine whether the whole stored code word is present in the

marked material item based on the dependent correlation value for the partial code word

exceeding a predetermined threshold, wherein

when the dependent correlation value does not exceed the predetermined threshold,

the correlator is operable to iteratively increase a number of parts of the partial code word

used, to increase information quantity of the recovered partial code word,

each time the information quantity of the partial code word is increased, the correlator

is operable to generate a dependent correlation value by correlating the partial code word that

having increased information quantity with a corresponding partial stored code word, the

iterative increasing of the information quantity of the partial code word continuing until the

whole code word is recovered by the recovery processor, and correlated with the whole

stored code word by the correlator, or the predetermined threshold exceeded.

Claim 18 (Previously Presented): An encoding data processing apparatus as claimed

in Claim 17, wherein the code word is chosen from a plurality of code words that are formed

from a first code word having a plurality of predetermined pseudo-randomly distributed

coefficients and by generating other code words of the set by cyclically shifting the first code

word.

Claims 19-20 (Cancelled).

Claim 21 (Currently Amended): A system for identifying versions of a material item,

the system comprising:

an encoding data processing apparatus operable to form marked versions of the

material item by combining each version with a code word having a plurality of parts, each

part including different data from the code word, the material item composed of a plurality of

units. each of the plurality of parts of the code word being combined with one of the plurality

of units, and

a detecting data processing apparatus operable to identify the code word present in a

marked version of the material item, the detecting data processing apparatus comprising

a recovery processor operable to recover a partial code word composed ~~by~~ of at least

one of the plurality of parts of a code word from at least one of the plurality of corresponding

units of the marked material item,

a correlator operable to generate for the marked material item a dependent correlation

value by correlating the partial code word with a corresponding partial stored code word that

is a part of a whole stored code word, and

a detector operable to determine whether the whole code word is present in the

marked material item based on the dependent correlation value for the partial code word

exceeding a predetermined threshold, wherein

when the dependent correlation value does not exceed the predetermined threshold,

the correlator is operable to iteratively increase a number of parts of the partial code word

used, to increase information quantity of the recovered partial code word,

each time the information quantity of the partial code word is increased, the correlator

is operable to generate a dependent correlation value by correlating the partial code word

having increased information quantity with a corresponding partial stored code word, the

iterative increasing of the information quantity of the partial code word continuing until the

whole code word is recovered by the recovery processor, and correlated with the whole

stored code word by the correlator, or the predetermined threshold exceeded.

Claim 22 (Previously Presented): A computer-readable medium having a computer

program recorded thereon, the program composed of computer executable instructions, which

when loaded on to a data processor causes the data processor to perform the method

according to Claim 11.

Claims 23-25 (Cancelled).

Claim 26 (Previously Presented): The data processing apparatus according to Claim 1, wherein the iterative increasing of the number of code word parts used increases the number by a factor two for each increase.

Claim 27 (Previously Presented): The method of identifying one of the plurality of code words according to Claim 11, wherein the iterative increasing of the number of code word parts used increases the number by a factor two for each increase.

Claim 28 (Previously Presented): The encoding data processing apparatus according to Claim 17, wherein the iterative increasing of the number of code word parts used increases the number by a factor two for each increase.

Claim 29 (Previously Presented): The system for identifying versions of the material item according to Claim 21, wherein the iterative increasing of the number of code word parts used increases the number by a factor two for each increase.